



## NEW HAMPSHIRE DIVISION OF HISTORICAL RESOURCES

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### REPORT ON OBSERVATIONS AT THE BATH VILLAGE BRIDGE BATH, NEW HAMPSHIRE

**JAMES L. GARVIN**  
**SEPTEMBER 18, 2008**

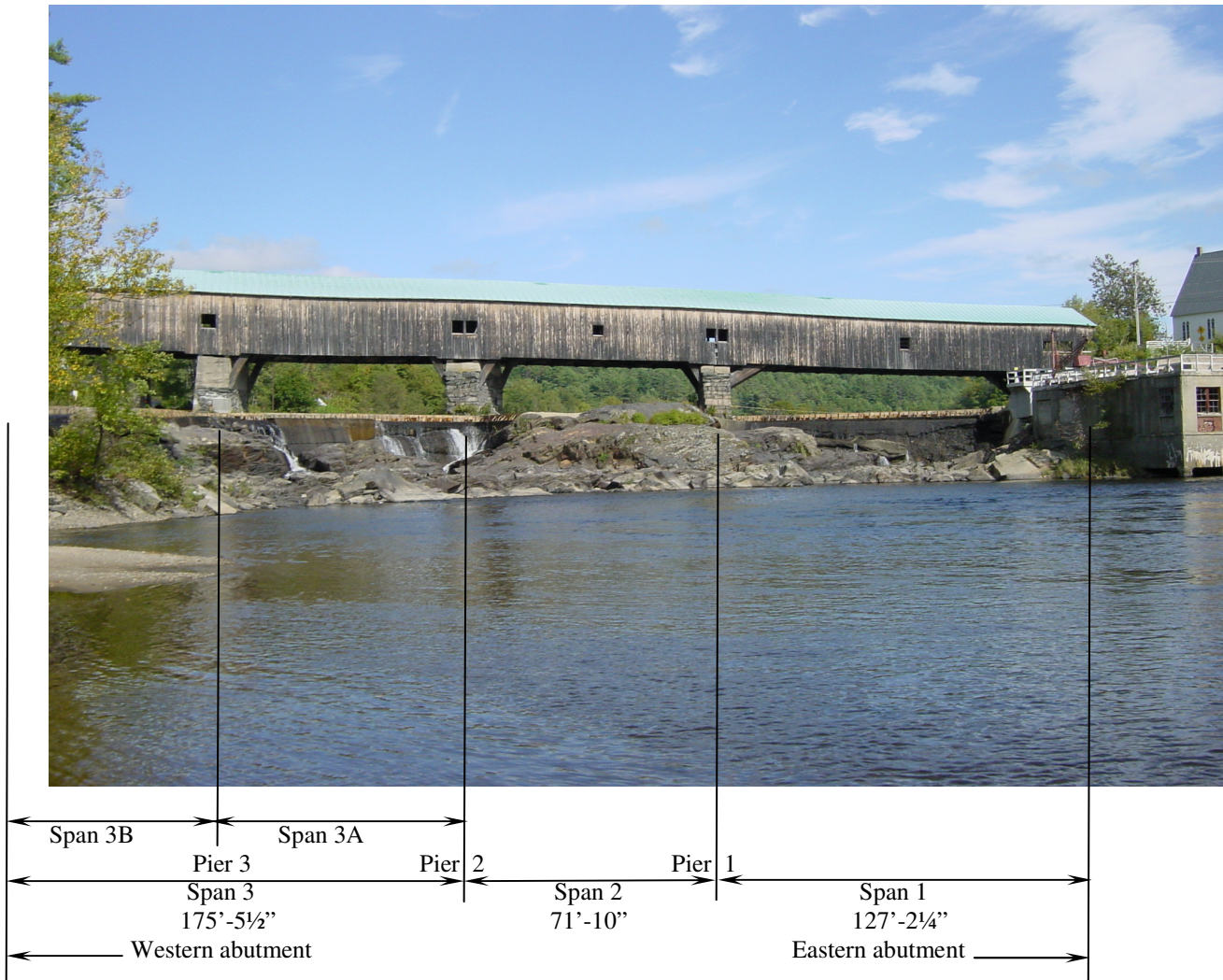
This report is based on observations made at the Bath Village Bridge on September 16, 2008. The inspection was made as part of a broader bridge evaluation by Sean James and Josif Bicja of Hoyle, Tanner & Associates, consulting engineers, assisted by crew members from Wright Constriction Company of Mount Holly, Vermont. The purpose of the Hoyle, Tanner inspection was to provide an update to their submitted in April 2006. The purpose of the Division of Historical Resources' inspection was to determine the condition, integrity, and evolution of the bridge in order to be prepared to apply the *Secretary of the Interior's Standards for the Treatment of Historic Properties* in any future review of proposals for treatment of the bridge.

Brief chronology of the Bath Village Bridge, taken from Joseph D. Conwill, "Historic American Engineering Record, Bath Bridge, HAER No. NH-34" (attached as Appendix 2):

- |         |  |
|---------|--|
| 1831    | Work begins on stonework for the present (fifth) bridge  |
| 1832    | The covered bridge is completed  |
| 1852-53 | White Mountain Railroad is constructed under the west end of the bridge                                |
| ?       | An extra pier is added under the long west span, turning the three-span bridge into a four-span bridge |
| 1913    | New Hampshire law requires bridges to be upgraded for 10-ton load                                      |
| 1918-19 | Bridge is raised about 2', laminated arches are added, other major repairs done                        |
| 1987-88 | Restoration by Milton S. Graton  |

#### **Original truss and arch elements**

The Bath Village Bridge is composed of three original spans of widely varying lengths. The bridge has apparently not been measured along its centerline, and the different angles of the abutments and the piers causes the upstream and downstream trusses in each span to display differing lengths. The HAER report mentioned above gives the total truss length of Bath Village Bridge as 374'-5¾" at the floor. The length of the east span is 127'-2¼" on the upstream side. The center span is 71'-10" in length, while the long original west span (now subdivided by an added pier at its center) was 175'-5½" long.



The bridge is well documented as having been constructed in 1832, and is therefore among the oldest surviving covered bridges in the United States. Despite its age and the fact that it is exposed to airborne spray during parts of each year, the structure retains a high percentage of its original truss and arch elements. These elements can be distinguished from later materials by the fact that they were sawn on a reciprocating (“up-and-down”) sawmill, of which there were several along the Ammonoosuc River from the late 1700s.

According to an appendix in the Hoyle, Tanner “Engineering Study for the Bath ‘Village’ Covered Bridge” of 2006, a diagonal brace and a chord member of the Bath Village Bridge were identified

as spruce (*Picea*), implying that most of the original structure was built of spruce. This finding is in contrast with the nearby Bath-Haverhill Town lattice truss bridge (1829), where the principal original members were identified as eastern white pine (*Pinus strobus*). In both cases, the bridges are located at seemingly unpropitious sites with stream levels close to the floors of the bridges above the adjacent dams, and with large amounts of airborne spray whenever water spills over the crests of these dams onto ledges below. Despite such conditions, the two neighboring bridges have survived not only as two of the oldest covered bridges in the country, but as structures that retain an unusually high amount of original fabric.

The posts and diagonal braces of the Bath Village Bridge are sawn on all four sides. Except where replaced, these members exhibit the parallel striations and torn wood fibers that characterize early mechanical sawing. These members also exhibit the same irregularity in size that was observed at the Bath-Haverhill Bridge; according to Joseph Conwill's Historic American Engineering Record (HAER) report, attached as an appendix, "posts and braces show manufacturing variation, but on average measure 4½" x 5¾".

The integral arches that form important components of the trusses in each of the three original spans of the bridge were formed from heavy sawn planks pinned together. Only two of the original three arches can be seen; the relatively short and low arch of the original middle span of the bridge is hidden by the four-foot-high wooden "wainscoting" that has been applied to the lower third of the trusses inside the bridge. The saw marks on the sides of the original arches match those of the truss web members.

The arches have been hewn on their upper and lower surfaces to gentle segmental curves that, in the case of the two longer original spans, bring the apex of each arch to the upper chord of the truss. This hewing was done with great skill, producing an even curve and smoothing the upper and lower surfaces of the arches so carefully that the adze marks can hardly be seen. It is apparent that the original planks from which these arches were hewn must have been of great depth to permit the curves to be laid out across their faces and to provide for the fourteen inch depth of each arch after the excess wood was hewn away.

### **Original sheathing**

All of the side boarding or sheathing on the downstream (south) side of the bridge is new, having been replaced in the rehabilitation of 1987-88.

On the upstream or north side of the bridge, sheltered from strong sunlight, a certain percentage of sheathing boards appear to be original, or at least were sawn on a reciprocating sawmill. No attempt was made to survey the entire north side of the bridge, but every effort should be made to identify and preserve any surviving early boards. Other boards on this side of the bridge display circular saw marks, yet are also old and have darkened through oxidation. Still others are clearly much newer.

### **Original and later bridge piers**

One principal effort of this examination was to verify the statement, made in Joseph Conwill's HAER report and elsewhere, that "the addition of a third pier divided the long west span of Bath Bridge [labeled as Span 3 on the photograph above] into two, making it a four-span bridge. There



is no evidence documenting when this was done, but it was probably during the nineteenth century since the new pier is dry-laid stone and difficult to distinguish from the two originals.”

Particular attention was paid to the splitting marks in the granite of the two easternmost piers and the later western pier. A chronology of splitting marks has been developed that differentiates between splitting methods used before and after circa 1830 (see Appendix 1). Since the Bath Village Bridge dates from 1832, with the stonework having been begun the year before, the substructure dates from the precise time when a transition in granite splitting technology was taking place in New Hampshire. The changes that occurred around 1830 should verify that Piers 1 and 2 are original and of the 1830 period, and that Pier 3 is later.

The fact that flat-wedge granite splitting was still being used in Bath in 1831, the year in which the two original piers were built, is verified by the William Vance Hutchins House, a granite dwelling of 1831 that stands a short distance from the bridge. As seen above the doorway and window in the photograph below, the walls of this building clearly show evidence of flat-wedge splitting.



The same splitting technique is clearly visible in both Pier 1 and Pier 2 of the Bath Village Bridge.





**Detail of east face of Pier 2, Bath Village Bridge**

By contrast, Pier 3 has fewer large split stones than Piers 1 and 2:



**East face of Pier 3, Bath Village Bridge**



While Pier 3 shows less evidence of splitting techniques, one of the lowest stones in this pier, clearly original, displays the marks of the plug drill, denoting its later date:



**South face of Pier 3, Bath Village Bridge**

Although stone splitting evidence confirms the long-held belief that Pier 3 was added beneath the center of Span 3 after completion of the bridge, this physical evidence cannot suggest how much later the pier was added. Because the flat-wedge method of splitting granite was supplanted by the plug-and-feathers method soon after the bridge was built, Pier 3 could date anywhere from a few years after completion of the span up to around 1910, when concrete supplanted stone masonry for most work. Although the stonework of Pier 3 is too crude to suggest railroad construction of the latter nineteenth century, it is possible that this pier was added to the bridge when tracks first passed under the bridge in 1852-3. It is possible that this pier was not originally built to the height of the others, but that it supported a wooden trestle that extended up to the bottom chords of the bridge.

### **Visible repairs and current floor system**

Bath Village Bridge reveals evidence of a number of repairs, many of them apparently predating the Graton rehabilitation. Some of these repairs are alluded to in Joseph Conwill's Historic American Engineering Record report (attached as an appendix). Regrettably, many repairs are probably masked by the replacement in 1996 of the wood-board "wainscoting" that had been removed from the bridge in 1987-88.

A number of tie beams linking the upper chords of the bridge were spliced, evidently in the Graton rehabilitation of 1987-88. A few were wholly replaced. The new work can be differentiated from the old by the color of the wood and by the fact that the replacement wood is circular sawn in contrast to the original members. Presumably, the inspection and evaluation carried out on September 15-17 by Hoyle, Tanner & Associates will enumerate all these earlier repairs and replacements in detail.

The existing floor beams in the bridge are of considerable interest in light of a proposal to raise the live load rating of the bridge from the current six tons to ten tons. Hoyle, Tanner engineers propose to accomplish this upgrade (if it is approved by the town) mainly by replacing the existing floor beams with beams of greater structural capacity.

In applying the *Secretary of the Interior's Standards for Rehabilitation* to this proposal, it will be crucial to evaluate the number of original or early members in the existing floor system.

Inspection of the floor on September 16, 2008, was limited to what could be seen from the ground on the west end of the bridge or from the ledges and the top of the dam in the middle of the bridge. With no boat or floating staging then available, no inspection of the floor at the eastern span of the bridge was possible.

Observations made from the available vantage points suggest that all of the floor beams now in the bridge are of recent date. Some existing beams appear to predate the rehabilitation of 1987-88. Those beams that were found to be sound in 1987-88 appear to have been turned over to allow new floor planking to be nailed into the sound wood of what had been the bottoms of the beams.

The majority of beams now seen in the bridge, however, appear to have been installed in 1987-88 above older needle beams and lower lateral bracing:







The new floor beams of 1987-88 appear to have been band-sawn on their sides, and cut to depth on a circular sawmill, leaving curved saw marks on their soffits, as seen below:



**Bottom: re-used floor beam. Middle and top: band-sawn floor beams sawn to depth on a circular saw**

Further discussion of future treatments of the Bath Village Bridge must take into consideration the age and condition of the current floor system as well as the loading requirements for the bridge, the budget available for rehabilitation, and other factors. This report is intended to record initial observations made during an inspection of less than a day. If work of an extensive nature is proposed for this bridge, further detailed study of the fabric of the structure will be required in order to place engineers' recommendations within the context of the historical integrity of the structure.

The Bath Village Bridge is one of the oldest covered bridges remaining in the United States. It is also unique in design, perhaps representing, as Joseph Conwill has suggested, "the last remnants of an old regional building tradition." For these reasons, the bridge requires the most detailed examination and the most thoughtful analysis of any treatments that may be proposed in the future.

## **APPENDIX 1**





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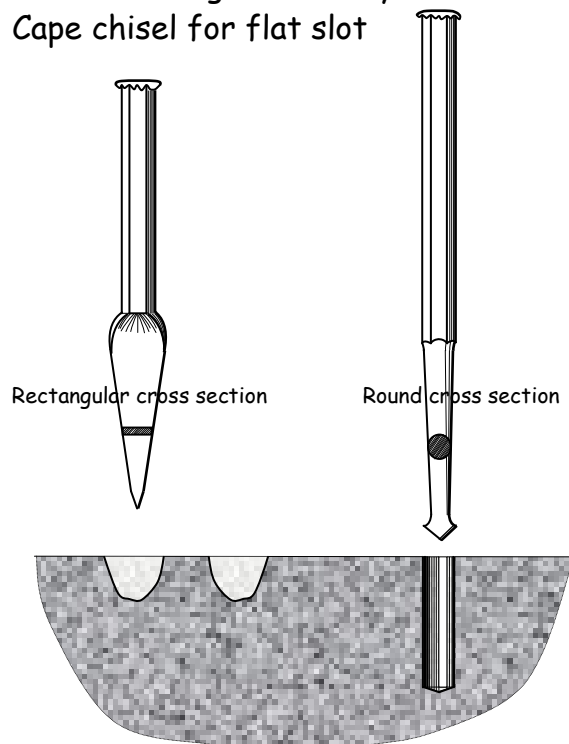
## GRANITE SPLITTING TOOLS AND TECHNIQUES

By about 1800, stonecutters in many parts of New England had perfected the basic techniques of finishing and shaping granite. These craftsmen were not only able to split large slabs and posts from boulders, but had also learned to use hammers and chisels to shape the stone to a wide variety of forms, including steps, thresholds, curbs, lintels, columns, watering troughs, and rainwater basins.

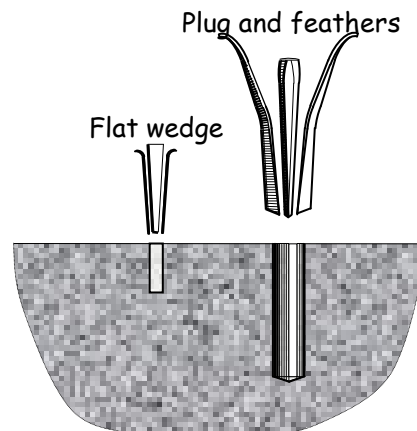
In the years just before 1830, a new granite splitting method was introduced. Each method of splitting granite leaves distinctive marks at the edge of the stone, and these marks reveal whether a given piece of granite was quarried or split before or after about 1830—useful knowledge in dating a building or a stone object.

Prior to about 1830, the procedure for splitting granite entailed the cutting of a line of shallow slots in the face of the stone, using a tool called a cape chisel, struck with a heavy hammer. Small, flat steel wedges were placed between shims of sheet iron and driven into these slots, splitting the stone. The new splitting method of circa 1830 used a “plug drill,” which had a V-shaped point and was rotated slightly between each blow of the hammer, creating a round hole two or three inches deep.

Plug drill for cylindrical hole  
 Cape chisel for flat slot

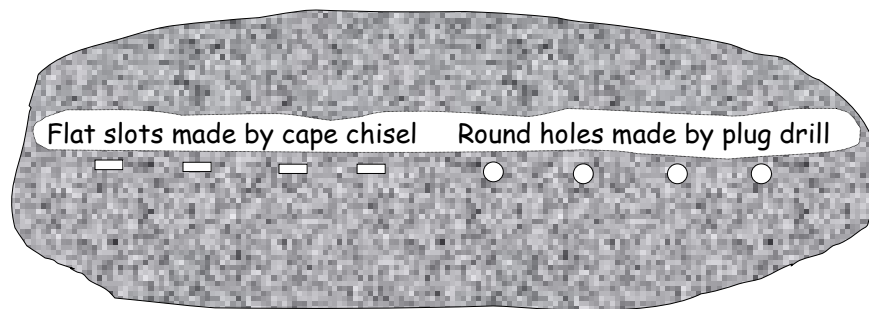


Into this hole were placed a pair of half-round steel shims or “feathers,” and between these was driven a wedge or “plug” which exerted outward pressure and split the stone. The advantage of the “plug-and-feathers” method of splitting was the greater depth within the stone at which the wedges exerted their pressure, thus allowing larger pieces to be split more accurately.



The new splitting technology seems to have spread rather rapidly through the granite quarrying centers of New England, although one is likely to find evidence of both old and new methods being used concurrently in stonework of the 1830s, especially in rural areas. The technique employed on a given stone can usually be seen on the split face, and provides some aid in dating granite masonry. The old, flat-wedge method is marked by a series of slot-like depressions which extend inward an inch or so from the edges of the split stone. The plug-and-feathers method leaves a row of rounded holes, two or three inches deep and usually about six inches apart.

When seen on the surface of a stone that was prepared for splitting but never split, these slots or holes appear as shown below:



The use of the plug drill in combination with the plug-and-feathers provided greater force and control in splitting granite. Until the introduction of the new technique, most granite for buildings and posts was split from surface boulders that had been strewn across the New England landscape at the retreat of the glaciers. Such stone had been transported by the ice from many points of origin, and each boulder challenged the stonecutter with different grain and behavior when split.

The introduction of the plug drill and plug-and-feathers seems to have enhanced stonecutters' ability to quarry granite from ledges. Ledge stone was more uniform in nature and predictable in behavior than granite split from surface boulders. With the opening of early quarries at ledges in Quincy, Chelmsford, and Rockport, Massachusetts; Concord, New Hampshire; and many locations in Maine, Vermont, and Rhode Island, New England began to assume its prominent place in the American and international granite industry.

*James L. Garvin*  
*State Architectural Historian*

## **APPENDIX 2**



## HISTORIC AMERICAN ENGINEERING RECORD

## BATH BRIDGE

HAER No. NH-34

LOCATION: Spanning Ammonoosuc River, Lisbon Road, Bath, Grafton County, New Hampshire  
UTM: 19:262766.4894683 Moosilauke, NH Quad

DATE OF  
CONSTRUCTION: 1832

STRUCTURAL  
TYPE: Modified Burr truss

DESIGNER/  
BUILDER: Unknown

PRESENT OWNER: Town of Bath

PREVIOUS &  
PRESENT USE: Public road bridge since its construction

SIGNIFICANCE: Bath Bridge is a rare survivor of the early craftsman tradition of wooden truss bridge construction, before design became standardized into several major types based on patented plans. It is also of interest for its location in the midst of a well-preserved village center.

HISTORIAN: Joseph D. Conwill, Editor, *Covered Bridge Topics*, July 2002

PROJECT  
INFORMATION: The National Covered Bridge Recording Project is part of the Historic American Engineering Records (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Historic American Buildings Survey/Historic American Engineering Record, a division of the National Park Service, U. S. Department of the Interior. The Federal Highway Administration funded this project.

### Chronology

1794	First bridge at Bath Village
1831	Work begins on stonework for the present (fifth) bridge
1832	The covered bridge is completed
1852-53	White Mountain Railroad is constructed under the west end of the bridge
?	An extra pier is added under the long west span, turning the three-span bridge into a four-span bridge
1913	New Hampshire law requires bridges to be upgraded for 10-ton load
1918-19	Bridge is raised about 2', laminated arches are added, other major repairs done
1987-88	Restoration by Milton S. Graton

## Bath and Its Early Bridges

Bath, New Hampshire, was already a small industrial center in the 1790s before there was any bridge. The town voted in November 1793 to bridge the Ammonoosuc River “over the mill-pond above Mr. Sargent’s and Esq. Hurd’s mills.” Built in 1794, the cost was still given in the British system as 110 pounds total, which equaled \$366.66.<sup>1</sup> It lasted until taken out by an ice jam, but the town voted in 1806 to replace it, and this time the cost was quoted in American dollars at \$1,000.<sup>2</sup> A third bridge, built in 1820, was washed out in February 1824 and again replaced. By 1827, repairs were already needed, and Caleb Hunt was selected to supervise the project. The fate of this fourth bridge is unknown.<sup>3</sup>

## Construction of the Present Bridge

A town meeting in March 1830 discussed rebuilding the bridge at Bath Village, but postponed action, probably because of expenses just incurred during construction of the Bath-Haverhill Bridge at Woodsville. In March 1831, the town meeting returned to the question. Voters approved \$1,400 to cover contracts for stonework that apparently had already been negotiated and decided to proceed with construction of the two abutments and two center piers. George Wetherell was chosen as town agent for the project, but most regrettably there is no record anywhere of the builder’s name. The 1831 meeting also resulted in a vote to procure timber and have it delivered to the site over the upcoming winter. A special meeting later in the year on November 16 voted \$400 more towards construction of the stonework; evidently construction was already in progress and the available funds had been used up.<sup>4</sup>

The March 1832 meeting raised a final \$1,500 to complete Bath Bridge, and this was probably for the wooden trusswork. The total cost was therefore around \$3,300.<sup>5</sup> The work seems to have been completed to satisfaction, because the March 1833 town meeting chose William V. Hutchins as agent “to prosecute all persons who shall violate the law in crossing said Bridge, & to procure Bords [sic] lettered and placed at the ends of said Bridge giving notice of a fine for those who violate the law in crossing.” A sign on the west portal still warns of a ONE DOLAR FINE TO DRIVE ANY TEAM FASTER THAN A WALK ON THIS BRIDGE. Such signs were still common on New

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<sup>1</sup> Rev. David Sutherland, *Address Delivered to the Inhabitants of Bath . . . with an Historical Appendix by Rev. Thomas Boutelle* (Boston: Geo. C. Rand & Avery, 1855), pp. 72-73.

<sup>2</sup> In some New England localities, money continued to be quoted in pounds, shillings, and pence even into the early nineteenth century, although dollar decimal coinage had been in circulation since 1794.

<sup>3</sup> Brian R. Pfeiffer, the historian who prepared the National Register nomination, which was approved in 1976, conjectures that fire destroyed the fourth bridge because there was much discussion of fire laws at the 1830 town meeting. This may be true, but this author does not find the evidence compelling, especially since Sutherland makes no mention of a fire.

<sup>4</sup> Bath Town Records, Volume 4. The years 1827-1839 were consulted. Available at the New Hampshire State Library, Concord, New Hampshire.

<sup>5</sup> Some writers have quoted a cost of \$2,900, but they missed the \$400 expenditure voted on November 16, 1831.

England covered bridges well into the twentieth century. The “walk,” of course, refers to a horse’s gait; a gallop or a trot sets up a regular vibration capable of shaking truss bridge members loose and causing serious damage.

In the nineteenth century, winter transportation was by sleigh or sled over frozen snow. Roads were rolled to make them passable; snow plowing and removal did not begin until the 1920s after automobiles arrived. Covered bridges were obstacles in such a transportation system. They were covered to keep the wooden trusses from rotting, not to keep the snow off in the winter. Bath town meeting minutes of the 1830s show that the highway surveyor (i.e., road commissioner) of the village district had to oversee snow being placed on the bridge deck in winter and cleaned off come spring.<sup>6</sup>

### Structural Details

The abutments and two original center piers of Bath Bridge are of dry-laid stone, but their orientation is odd. The two abutments are more or less square to the river, but the two piers are both skewed. This makes the span lengths different from one side of the bridge to the other and presented obvious challenges in framing the trusses. Moreover, the original span lengths were very uneven; the two piers are spaced closely together in the middle of the river. There is no obvious explanation for this peculiarity. Perhaps subsurface conditions for foundations dictated the placement of the piers; or there may have been some special problems regarding the flow of the river’s current.

The total truss length of Bath Bridge measures 374’-5¾” at the floor. Structure length of the east span is 127’-2¼” on the upstream side. The downstream side was not measured, but is two panels longer because of the skewed pier. From the position of the truss center posts in relation to the highest point of the arch, it is evident that the builder intended the upstream truss to be the standard and the downstream truss to be the deviation. The center span is only 71’-10” in structure length, while the long original west span was 175’-5½”. Here the downstream truss measures three panels shorter, so this pier appears to be more skewed than the other. Where the short center span meets the long original west span, the builder had trouble fitting his panel lengths to the piers, so there is an odd short panel.

Posts and braces show manufacturing variation, but on average measure 4½” x 5¾”. The braces do not foot on shoulders on the posts in the same plane. Instead, they are treenailed across the outside of the post frame with a single 1¾” treenail at the joint and no mortise. They overlap the panel points and continue on to the chords, where they are mortised through. The chords themselves are built up of three vertical leaves, with posts mortised through the inside joint and braces mortised through the other. This framing

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<sup>6</sup> Records from other New England towns describe “snowing” covered bridges in winter, but there are no known photographs of the operation in progress. Two Maine Highway Commission photographs from the early 1920s do show covered bridge interiors with snow on the deck.



detail is surprisingly similar to the counterbrace treatment developed a decade later by Peter Paddleford of nearby Littleton, but there is no evidence connecting him with Bath Bridge.

Bath Bridge also has original timber arches integral with the trusses. Like the chords, they are built up of three vertical leaves of timber placed together with no space; the posts are mortised through the inside joint, and the braces are mortised through the outside joint. The arch ends are tied to the lower chords and do not foot directly on the abutments. Such intricate joinery requires an almost unthinkable amount of custom labor.

Bath Bridge represents an early, idiosyncratic craftsman tradition of wooden truss bridge building, before designs became more standardized under the influence of the major patented truss plans. It is very difficult to classify. It is more like a Burr truss than anything else, but the standard Burr does not have the braces overlapping the panel points, and it usually has the arch footing directly on the abutments. Because of the overlapping braces, Bath Bridge slightly resembles the Haupt truss, but this was not patented until 1839, and the 1832 date for Bath Bridge is very well established.

One other New England covered bridge shares the same truss plan, the Sayres Bridge over Ompompanoosuc River at Thetford Center, Vermont. The framing details are rather similar, but the timber sizes are different, and the brace/post joints are made with two treenails, not one as at Bath. These two bridges may be the last remnants of an old regional building tradition, but neither date nor builder is known for Sayres Bridge.<sup>7</sup> It is often inaccurately listed as a Haupt truss.

### Other Framing Details

Bath Bridge is unusually wide inside, measuring 22'. Of this, about 18' is the roadway, and about 4' is a separate raised sidewalk platform on the upstream side. It is impossible to tell whether the bridge had this feature as originally built.

The floor beams measure about 7½" x 15½" but are not original. There are two per panel, and as the panel spacing is only about 4', the floor beams are numerous.

Like other New Hampshire covered bridges, Bath Bridge has been modified over the years, especially during the early twentieth century.

### Repair Record

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<sup>7</sup> Sayres Bridge also has an extra post at the center, which Bath Bridge does not have. Some believe that the former Pattersonville Bridge of Norwich, Vermont, was a third example of this regional style, but it seems instead to have been a true Haupt truss, and thus a later structure.

In 1852, the White Mountain Railroad was graded along the west bank of Ammonoosuc River underneath Bath Bridge. Rails were laid, and service began in 1853.<sup>8</sup> Apparently the bridge required no structural modifications at the time, but since steam engines passed closely under it for about a century, it is fortunate that it never caught fire. At some unknown time, the railroad installed sheet metal under the bridge in the area of the tracks to prevent sparks from lodging.<sup>9</sup>

The addition of a third pier divided the long west span of Bath Bridge into two, making it a four-span bridge. There is no evidence documenting when this was done, but it was probably during the nineteenth century since the new pier is dry-laid stone and difficult to distinguish from the two originals. Had the pier been added when the laminated arches were installed in 1918-19, it would surely have been of concrete.

By a 1913 act of the New Hampshire legislature, bridges were to be made safe for 10-ton loads after April 1, 1915.<sup>10</sup> The law created a tremendous burden for small towns, and compliance was slow. Bath Bridge at the time was posted for 2 tons. Concerned, the town asked famed bridge engineer John W. Storrs of Concord for an opinion. He said that the bridge had probably carried more than 2 tons but recommended that the posted load not be exceeded.

At a 1918 town meeting, Bath voted funds “for extraordinary repairs on Bath bridge.” It was suggested to raise \$1,000 by taxation and finance the rest. Mr. C. C. Battey, recommended by engineer Storrs, presented an estimate covering various options. Later, when the work was done, he inspected it, but it is unclear how much he did himself, if any.

By 1919, the bridge straightening project had cost \$7,076.61. This was more than foreseen, but more work had been required. Among other things, the railroad decided that the bridge should be raised 2' higher over the tracks and paid for the actual raising, but various expenses such as regrading the road had to be covered by the town.

Work got underway in 1918 when Cyrus Batchelder repaired a flood-damaged pier and cut skewbacks into the old piers and abutments to receive laminated arches. The stonework also received concrete caps so that the bridge could be raised. Some 70,000 board feet of lumber of all kinds went into the project. The arch planks appear to have been hemlock. Much red and yellow pine was used, probably for the floor system.

Twelve or thirteen leaf laminated arches went into the easterly three spans, but the west span, over the railroad tracks, did not get a new arch. At some point, wooden horses were added to either side of the tracks; these may have been part of the same project in

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<sup>8</sup> Sutherland, p. 74.

<sup>9</sup> Richard G. Marshall, *New Hampshire Covered Bridges: A Link with our Past* (Concord: New Hampshire Department of Transportation, 1994), p. 53.

<sup>10</sup> *Annual Report of the Town Officers*, 1915, p. 25. Information in the following paragraphs comes from the same source for 1918 and 1919.

lieu of arches. The new arches were connected to needle beams under the lower chords of the truss by means of hanger rods on spacing varying from 8'-0" to 8'-6". The new arches and needle beams relieved some of the load from the trusses, but there is no direct connection to the floor system, as is usually done.<sup>11</sup>

Photographs dating as late as ca. 1950 show the west portal of Bath Bridge with a semielliptical arched entry, housed in narrow clapboards, similar to portals found on Peter Paddleford's bridges. Soon thereafter the entry was squared off higher to allow more clearance, and the older configuration has never been restored. The east portal was so modified decades earlier.

### Milton S. Graton

By 1987, Bath Bridge was in need of major repairs, and the job went to Milton S. Graton of Ashland, New Hampshire, one of the premier bridge wrights of the twentieth century.<sup>12</sup> There was a low interior boarding like a wainscot, which Graton removed. He found many posts badly gnawed, and several were chewed all the way through. Local legend stated that residents had once used the bridge as a stable to tie up their horses while uphill at the village church or at saloons, and the restless horses had chewed the posts. This practice may have been very old, for the 1834 town meeting entrusted the agent who enforced the speed limit with keeping the bridge clear from "horses or cattle or anything else which shall have a tendency to injure the people who may cross."<sup>13</sup> Graton's preferred practice was to leave original members in place, sistering new ones alongside to preserve the historic fabric.

The interior wainscot was perhaps intended to prevent future horse damage, but this danger was long past and Graton did not replace it. Later the town reinstalled it, although this makes it impossible to inspect and clean around the lower chords. Covered bridges always collect dust, which, by retaining moisture, can cause rot. Old town records throughout New England show small expenditures for ongoing maintenance, including cleaning and sweeping, but in recent decades most towns have neglected this important detail.

Graton completed restoration in early 1988. Other work included reinforcing the arch ends where they are tied to the truss, and reroofing the bridge. Much rot had to be repaired over the former railroad tracks where the spark-arresting layer of sheet metal trapped moisture.

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<sup>11</sup> Some of the laminated arches have extra leaves, apparently added at a later date. It is not known when this was done, but it was not part of the Graton restoration of 1987-88.

<sup>12</sup> Graton is pronounced with a long "a." Information on the restoration comes from David W. Wright of Westminster, Vermont, president of the National Society for the Preservation of Covered Bridges. He visited Bath regularly while the work was in progress.

<sup>13</sup> Jonathan Smith was agent in 1834. The position seems to have been that of a special constable.

Bath Bridge today is in generally good condition and carries a moderate load of local traffic. There is a small sag in the second span from the west, the cause of which should be investigated.

### Bath Village

Old accounts refer to Bath “Lower Village” and “Upper Village.” Downtown Bath, with the covered bridge, is the Lower Village. The Upper Village today is a lovely collection of late Federal homes, located about a mile and a half north of downtown. There is no church or store.

In addition to the famous covered bridge, Bath “Lower Village” includes a church with an unusual shingled steeple that usually appears black in photographs and an old brick general store. There were sawmills and gristmills even before the construction of the first bridge, and a dam.<sup>14</sup> Early in the nineteenth century, the village also saw the activity of an iron forge, and probably also a woolen mill, later a dye house.

In 1872, Conant and Company built a pulp mill just downstream from the covered bridge. This later became the Bath Lumber Company sawmill. Cushman-Rankin Company built a leather board mill on the site, which a fire destroyed in 1952. In 1953, Bath Fiber Company built a heeling board mill. A fire destroyed this in 1975 after the bridge sat vacant for some time.<sup>15</sup> The power dam is still intact just downstream from the covered bridge and makes for a spectacular view.

Bath Bridge was the last covered bridge in North America to span railroad tracks.<sup>16</sup> The tracks themselves are gone, but the roadbed remains, along with a telltale north of the bridge.<sup>17</sup> On the old roadbed nearby is an old Boston & Maine caboose converted to a residence. The blue enamel sign saying BATH on the portal of the bridge is probably of railroad origin. With some imagination, it is still possible to see Bath as a small industrial village served by the White Mountain Railroad, with a magnificent covered bridge at its heart.

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<sup>14</sup> *Historical Notes of Bath, New Hampshire, 1765-1965* (Bath: Town Bicentennial Committee, 1965), pp. 5 ff.

<sup>15</sup> Christine Schultz, “The Price of History in New Hampshire,” *Yankee* (December 2001), pp. 34-38. Thanks to Sarah Dangelas for bringing this source to my attention.

<sup>16</sup> Of course, it mainly served to cross Ammonoosuc River. There were several covered bridges built solely to cross railroad tracks. Notable examples stood at East Deerfield, Massachusetts; Troy, New York; and Allentown, Washington.

<sup>17</sup> A telltale is a row of strips hanging from a frame over the railroad track, intended to warn a brakeman on top of a car of the approach of a low bridge or tunnel entry.



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